

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #1100248

Project: Dimock Residential GW Site, Dimock, PA
 Analysis method: Gamma Spectrometry
 Report ID: 1100248-GAMMA
 Report type: Original
 Date reported: 03/29/2012
 Total pages in report: 30

SAMPLES

| NAREL Sample # | Client Sample ID | Location | Matrix | Date Collected | Date Received |
|----------------|------------------|-----------|----------------|----------------|---------------|
| B2.01731G | HW49 | PA:DIMOCK | WATER-DRINKING | 02/09/2012 | 02/13/2012 |
| B2.01732H | FB14 | PA:DIMOCK | WATER-DRINKING | 02/09/2012 | 02/13/2012 |
| B2.01733J | HW21Z | PA:DIMOCK | WATER-DRINKING | 02/09/2012 | 02/13/2012 |
| B2.01734K | HW22 | PA:DIMOCK | WATER-DRINKING | 02/09/2012 | 02/13/2012 |
| B2.01735L | HW44 | PA:DIMOCK | WATER-DRINKING | 02/09/2012 | 02/13/2012 |
| B2.01736M | HW36N | PA:DIMOCK | WATER-DRINKING | 02/10/2012 | 02/13/2012 |
| B2.01737N | HW54 | PA:DIMOCK | WATER-DRINKING | 02/10/2012 | 02/13/2012 |
| B2.01761N | HW55 | PA:DIMOCK | WATER-DRINKING | 02/13/2012 | 02/14/2012 |
| B2.01762P | FB16 | PA:DIMOCK | WATER-DRINKING | 02/13/2012 | 02/14/2012 |
| B2.01763Q | HW27 | PA:DIMOCK | WATER-DRINKING | 02/13/2012 | 02/14/2012 |
| B2.01777X | FB17 | PA:DIMOCK | WATER-DRINKING | 02/14/2012 | 02/15/2012 |
| B2.01778Y | HW57 | PA:DIMOCK | WATER-DRINKING | 02/14/2012 | 02/15/2012 |
| B2.01779Z | HW03 | PA:DIMOCK | WATER-DRINKING | 02/14/2012 | 02/15/2012 |
| B2.01780R | HW03Z | PA:DIMOCK | WATER-DRINKING | 02/14/2012 | 02/15/2012 |
| B2.01781T | HW58 | PA:DIMOCK | WATER-DRINKING | 02/14/2012 | 02/15/2012 |
| B2.01782U | HW11 | PA:DIMOCK | WATER-DRINKING | 02/13/2012 | 02/15/2012 |
| B2.01783V | HW27Z | PA:DIMOCK | WATER-DRINKING | 02/13/2012 | 02/15/2012 |
| B2.01784W | HW53 | PA:DIMOCK | WATER-DRINKING | 02/13/2012 | 02/15/2012 |
| B2.01785X | HW59 | PA:DIMOCK | WATER-DRINKING | 02/14/2012 | 02/15/2012 |
| B2.01877A | HW07 | PA:DIMOCK | WATER-DRINKING | 02/15/2012 | 02/16/2012 |

EXCEPTIONS

- Packaging and shipping**—No problems were observed.
- Documentation**— NAREL originally agreed to analyze 71 samples for this project, but sample collectors collected and shipped more samples than expected. NAREL then agreed to analyze 100 samples, which would make five batches of 20 for QC purposes. Actually 101 samples were received. With the client's permission, NAREL did not analyze the field blank received in the last shipment thus making the agreed upon total of 100 samples for analysis.
- Sample preparation**—No problems were encountered.
- Analysis**— NAREL normally assumes that the radon daughter nuclides Pb-214 and Bi-214 in environmental matrices are in equilibrium with Ra-226 and therefore decay corrects the concentrations of those nuclides using the 1,600 year Ra-226 half life. For this project, the results of gross alpha/beta and radium analysis are inconsistent with that assumption, and the observed decay rate between replicate gamma analyses of the same aliquant performed on different days indicates that the parent contaminant is dissolved radon gas rather than

Ra-226. Pb-214 and Bi-214 concentrations in water samples for this project were therefore decay corrected to the time of sample collection using the 3.842 day half life of their parent nuclide, Rn-222. Radon is known to slowly escape from plastic sample containers, therefore the actual concentrations at the time of sampling are likely higher than the measured concentrations. As stated earlier, a replicate analysis on the same sample performed at a later time would be expected to result in somewhat lower measured Pb-214 and Bi-214 concentrations than the initial analysis.

Also, the gamma analyst used two different commercial software systems to analyze different samples in the same QC batch in order to keep turnaround times short. One software system calculates a minimum detectable concentration (MDC) but the other does not. NAREL is reporting the results as generated in this data package, but at the client's request NAREL will reanalyze the affected samples. However, the unsupported radon and its progeny will have decayed even more.

5. **Holding times**—No holding times were specified.

QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

for Mary F. Wisdom 3/29/12
Mary F. Wisdom
Quality Assurance Manager, NAREL
Date

John Cynthia White (Acting CERLS Dir) 3-29-12
John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science
Date

GENERAL INFORMATION

SAMPLE TYPES

| | |
|-----|---------------|
| BLD | Blind sample |
| FBK | Field blank |
| SAM | Normal sample |

ANALYSIS QC TYPES

| | |
|-----|---|
| ANA | Normal analysis |
| DUP | Laboratory duplicate |
| LCS | Laboratory control sample (blank spike) |
| MS | Matrix spike |
| MSD | Matrix spike duplicate |
| RBK | Method blank |

QUALITY INDICATORS

| | |
|-----|---|
| RPD | Relative Percent Difference |
| %R | Percent Recovery |
| Z | Number of standard deviations by which a QC measurement differs from the expected value |

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity, 2-sigma uncertainty, and a sample-specific estimate of the MDC for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected above background with the exception of client requested nuclides of interest. The activity for each of the requested nuclides is reported whether negative, positive, or zero along with the associated 2-sigma uncertainty.

For this group of samples, NAREL used two different gamma analysis software systems. One system provides a sample-specific estimate of the MDC for every sample result. The other does not. The reader can tell which software was used for a particular sample by looking at the column labeled "MDC."

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

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ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

| NAREL Sample # | QC Type | Preparation Procedure | Date Completed | Assay Batch # | QC Batch # |
|-----------------|---------|-----------------------|----------------|---------------|------------|
| B2.01731G | | N/A | 02/27/2012 | 0015743M | 0008495N |
| B2.01732H | | N/A | 02/25/2012 | 0015743M | 0008495N |
| B2.01733J | | N/A | 02/25/2012 | 0015743M | 0008495N |
| B2.01734K | | N/A | 02/25/2012 | 0015743M | 0008495N |
| B2.01735L | | N/A | 02/27/2012 | 0015743M | 0008495N |
| B2.01736M | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01737N | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01761N | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01762P | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01763Q | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01777X | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01778Y | | N/A | 02/28/2012 | 0015743M | 0008495N |
| B2.01779Z | | N/A | 02/29/2012 | 0015743M | 0008495N |
| B2.01780R | | N/A | 02/25/2012 | 0015743M | 0008495N |
| B2.01780R | DUP | N/A | 02/25/2012 | 0015743M | 0008495N |
| B2.01781T | | N/A | 02/29/2012 | 0015743M | 0008495N |
| B2.01782U | | N/A | 02/29/2012 | 0015743M | 0008495N |
| B2.01783V | | N/A | 02/29/2012 | 0015743M | 0008495N |
| B2.01784W | | N/A | 02/29/2012 | 0015743M | 0008495N |
| B2.01785X | | N/A | 02/29/2012 | 0015743M | 0008495N |
| B2.01877A | | N/A | 02/29/2012 | 0015743M | 0008495N |
| LCS-00631915X * | LCS | N/A | 02/29/2012 | 0015743M | 0008495N |
| RBK-00631916Y * | RBK | N/A | 02/28/2012 | 0015743M | 0008495N |

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

| | |
|--------------|-------|
| Procedure ID | Title |
| | |

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SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01731G | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 10:52 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2\sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|------------------------------|---------|-------|----------------------|
| Bi212 | 6.69e+00 | 1.3e+01 | 2.1e+01 | PCI/L | 02/09/2012 14:11 EST |
| Bi214 * | 5.62e+02 | 1.0e+02 | 9.6e+01 | PCI/L | 02/09/2012 14:11 EST |
| K40 | -7.63e+00 | 1.3e+01 | 1.8e+01 | PCI/L | 02/09/2012 14:11 EST |
| Pb214 * | 6.13e+02 | 1.1e+02 | 1.1e+02 | PCI/L | 02/09/2012 14:11 EST |
| Ra226 * | -1.87e+01 | 1.5e+02 | 5.4e+01 | PCI/L | 02/09/2012 14:11 EST |
| Ra228 | 1.42e+00 | 3.0e+00 | 5.7e+00 | PCI/L | 02/09/2012 14:11 EST |
| Th234 | -1.47e+02 | 4.6e+03 | 3.4e+02 | PCI/L | 02/09/2012 14:11 EST |
| U235 * | 2.35e-01 | 1.2e+01 | 1.9e+01 | PCI/L | 02/09/2012 14:11 EST |

* An asterisk indicates a result that may be significantly under or overestimated

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SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01732H | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | Aqueous | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/24/2012 15:06 | 1000.0 | GE15 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | -4.47e+00 | 1.7e+01 | | PCI/L | 02/09/2012 13:36 EST |
| Bi214 * | -2.62e+01 | 4.9e+01 | | PCI/L | 02/09/2012 13:36 EST |
| K40 | 7.29e+00 | 1.3e+01 | | PCI/L | 02/09/2012 13:36 EST |
| Pb212 | 4.87e+00 | 2.6e+00 | | PCI/L | 02/09/2012 13:36 EST |
| Pb214 * | 2.61e+00 | 4.8e+01 | | PCI/L | 02/09/2012 13:36 EST |
| Ra226 * | 6.19e+00 | 3.2e+01 | | PCI/L | 02/09/2012 13:36 EST |
| Ra228 | -5.69e+00 | 5.1e+00 | | PCI/L | 02/09/2012 13:36 EST |
| Th234 * | 6.08e+01 | 3.3e+01 | | PCI/L | 02/09/2012 13:36 EST |
| Tl208 | 9.53e-01 | 1.2e+00 | | PCI/L | 02/09/2012 13:36 EST |
| U235 * | -2.62e+01 | 8.2e+00 | | PCI/L | 02/09/2012 13:36 EST |

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01733J | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/24/2012 15:06 | 1000.0 | GE16 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | -6.20e+00 | 1.1e+01 | | PCI/L | 02/09/2012 10:53 EST |
| Bi214 * | 4.89e+02 | 6.8e+01 | | PCI/L | 02/09/2012 10:53 EST |
| K40 | 2.17e+00 | 1.1e+01 | | PCI/L | 02/09/2012 10:53 EST |
| Pb212 * | -3.78e+00 | 1.4e+00 | | PCI/L | 02/09/2012 10:53 EST |
| Pb214 * | 4.81e+02 | 6.5e+01 | | PCI/L | 02/09/2012 10:53 EST |
| Ra226 * | -1.68e+00 | 2.1e+01 | | PCI/L | 02/09/2012 10:53 EST |
| Ra228 | -1.36e+00 | 2.9e+00 | | PCI/L | 02/09/2012 10:53 EST |
| Th234 * | -4.32e+01 | 2.2e+01 | | PCI/L | 02/09/2012 10:53 EST |
| U235 * | -2.13e+01 | 5.5e+00 | | PCI/L | 02/09/2012 10:53 EST |

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01734K | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/24/2012 15:07 | 1000.0 | GE22 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 3.73e+00 | 1.4e+01 | | PCI/L | 02/09/2012 10:42 EST |
| Bi214 * | 3.09e+02 | 5.5e+01 | | PCI/L | 02/09/2012 10:42 EST |
| K40 | 7.77e+00 | 1.2e+01 | | PCI/L | 02/09/2012 10:42 EST |
| Pb212 * | -4.56e+00 | 2.1e+00 | | PCI/L | 02/09/2012 10:42 EST |
| Pb214 * | 3.86e+02 | 5.8e+01 | | PCI/L | 02/09/2012 10:42 EST |
| Ra226 * | 5.38e+00 | 1.8e+01 | | PCI/L | 02/09/2012 10:42 EST |
| Ra228 | -4.14e+00 | 4.6e+00 | | PCI/L | 02/09/2012 10:42 EST |
| Th234 * | -4.95e+01 | 3.2e+01 | | PCI/L | 02/09/2012 10:42 EST |
| U235 * | -8.90e+00 | 6.2e+00 | | PCI/L | 02/09/2012 10:42 EST |

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01735L | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 15:54 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | 7.91e+00 | 1.2e+01 | 2.0e+01 | PCI/L | 02/09/2012 14:49 EST |
| Bi214 * | 6.16e+02 | 1.0e+02 | 9.5e+01 | PCI/L | 02/09/2012 14:49 EST |
| K40 | 2.11e+00 | 1.2e+01 | 1.9e+01 | PCI/L | 02/09/2012 14:49 EST |
| Pb214 * | 6.52e+02 | 1.2e+02 | 1.2e+02 | PCI/L | 02/09/2012 14:49 EST |
| Ra226 * | -3.33e+00 | 3.9e+01 | 5.3e+01 | PCI/L | 02/09/2012 14:49 EST |
| Ra228 | 1.70e+00 | 3.8e+00 | 5.5e+00 | PCI/L | 02/09/2012 14:49 EST |
| Th234 | -4.82e+01 | 4.1e+02 | 3.3e+02 | PCI/L | 02/09/2012 14:49 EST |
| U235 * | -5.09e+00 | 1.1e+01 | 1.8e+01 | PCI/L | 02/09/2012 14:49 EST |

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01736M | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 20:56 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | -1.44e+00 | 1.2e+01 | 2.0e+01 | PCI/L | 02/10/2012 10:53 EST |
| Bi214 * | 1.22e+02 | 6.6e+01 | 8.6e+01 | PCI/L | 02/10/2012 10:53 EST |
| K40 | 2.00e+00 | 1.3e+01 | 1.9e+01 | PCI/L | 02/10/2012 10:53 EST |
| Pa234m | 1.08e+02 | 8.5e+01 | 1.3e+02 | PCI/L | 02/10/2012 10:53 EST |
| Pb214 * | 1.48e+02 | 6.7e+01 | 9.0e+01 | PCI/L | 02/10/2012 10:53 EST |
| Ra226 * | -1.50e+01 | 9.3e+01 | 5.1e+01 | PCI/L | 02/10/2012 10:53 EST |
| Ra228 | -5.25e-01 | 3.6e+00 | 5.9e+00 | PCI/L | 02/10/2012 10:53 EST |
| Th234 | -9.09e+01 | 9.0e+02 | 2.9e+02 | PCI/L | 02/10/2012 10:53 EST |
| U235 * | -1.06e+00 | 1.3e+01 | 1.7e+01 | PCI/L | 02/10/2012 10:53 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248
SAMPLE ANALYSIS REPORT**

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01737N | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 14:31 | 1000.0 | GE03 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 1.73e+01 | 1.4e+01 | | PCI/L | 02/10/2012 14:08 EST |
| Bi214 * | 1.13e+03 | 1.5e+02 | | PCI/L | 02/10/2012 14:08 EST |
| K40 | 1.55e+01 | 1.6e+01 | | PCI/L | 02/10/2012 14:08 EST |
| Pb212 * | -6.35e+00 | 2.8e+00 | | PCI/L | 02/10/2012 14:08 EST |
| Pb214 * | 1.10e+03 | 1.4e+02 | | PCI/L | 02/10/2012 14:08 EST |
| Ra226 * | 1.86e+01 | 3.3e+01 | | PCI/L | 02/10/2012 14:08 EST |
| Ra228 * | -6.11e-02 | 5.3e+00 | | PCI/L | 02/10/2012 14:08 EST |
| Th234 * | -7.07e+00 | 5.6e+01 | | PCI/L | 02/10/2012 14:08 EST |
| U235 * | -1.56e+01 | 9.5e+00 | | PCI/L | 02/10/2012 14:08 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248
SAMPLE ANALYSIS REPORT**

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01761N | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 14:31 | 1000.0 | GE15 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 2.31e+00 | 1.7e+01 | | PCI/L | 02/13/2012 10:21 EST |
| Bi214 * | 3.44e+02 | 5.5e+01 | | PCI/L | 02/13/2012 10:21 EST |
| K40 | 7.97e+00 | 1.3e+01 | | PCI/L | 02/13/2012 10:21 EST |
| Pb212 | 2.76e+00 | 2.6e+00 | | PCI/L | 02/13/2012 10:21 EST |
| Pb214 * | 3.81e+02 | 5.7e+01 | | PCI/L | 02/13/2012 10:21 EST |
| Ra226 * | 5.04e+00 | 3.3e+01 | | PCI/L | 02/13/2012 10:21 EST |
| Ra228 | -3.34e+00 | 5.3e+00 | | PCI/L | 02/13/2012 10:21 EST |
| Th234 * | 4.17e+01 | 3.3e+01 | | PCI/L | 02/13/2012 10:21 EST |
| U235 * | -2.60e+01 | 8.5e+00 | | PCI/L | 02/13/2012 10:21 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248
SAMPLE ANALYSIS REPORT**

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01762P | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | Aqueous | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 14:31 | 1000.0 | GE16 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | -1.20e+00 | 9.7e+00 | | PCI/L | 02/13/2012 09:06 EST |
| Bi214 * | -4.52e+00 | 3.3e+01 | | PCI/L | 02/13/2012 09:06 EST |
| K40 | 1.91e+00 | 9.9e+00 | | PCI/L | 02/13/2012 09:06 EST |
| Pb212 | 1.29e+00 | 1.2e+00 | | PCI/L | 02/13/2012 09:06 EST |
| Pb214 * | -5.30e+00 | 2.9e+01 | | PCI/L | 02/13/2012 09:06 EST |
| Ra226 * | 3.82e+00 | 1.9e+01 | | PCI/L | 02/13/2012 09:06 EST |
| Ra228 | 1.25e+00 | 2.5e+00 | | PCI/L | 02/13/2012 09:06 EST |
| Th234 * | -2.31e+01 | 2.0e+01 | | PCI/L | 02/13/2012 09:06 EST |
| U235 * | -2.00e+01 | 5.1e+00 | | PCI/L | 02/13/2012 09:06 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248
SAMPLE ANALYSIS REPORT**

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01763Q | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/27/2012 14:31 | 1000.0 | GE22 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 2.56e+00 | 1.4e+01 | | PCI/L | 02/13/2012 10:37 EST |
| Bi214 * | 2.55e+02 | 4.6e+01 | | PCI/L | 02/13/2012 10:37 EST |
| K40 | 2.78e+00 | 1.2e+01 | | PCI/L | 02/13/2012 10:37 EST |
| Pb212 * | -4.82e+00 | 2.1e+00 | | PCI/L | 02/13/2012 10:37 EST |
| Pb214 * | 2.63e+02 | 4.4e+01 | | PCI/L | 02/13/2012 10:37 EST |
| Ra226 * | 4.09e+00 | 1.8e+01 | | PCI/L | 02/13/2012 10:37 EST |
| Ra228 | -2.25e+00 | 4.5e+00 | | PCI/L | 02/13/2012 10:37 EST |
| Th234 * | -5.03e+01 | 3.1e+01 | | PCI/L | 02/13/2012 10:37 EST |
| U235 * | -9.93e+00 | 6.2e+00 | | PCI/L | 02/13/2012 10:37 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248
SAMPLE ANALYSIS REPORT**

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01777X | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | Aqueous | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 11:23 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | 3.10e+00 | 1.1e+01 | 1.8e+01 | PCI/L | 02/14/2012 09:09 EST |
| Bi214 * | 3.81e+01 | 3.5e+01 | 4.8e+01 | PCI/L | 02/14/2012 09:09 EST |
| K40 | -2.19e+00 | 1.4e+01 | 1.9e+01 | PCI/L | 02/14/2012 09:09 EST |
| Pb214 * | 9.69e+00 | 3.4e+01 | 6.0e+01 | PCI/L | 02/14/2012 09:09 EST |
| Ra226 * | -5.55e+00 | 4.3e+01 | 5.0e+01 | PCI/L | 02/14/2012 09:09 EST |
| Ra228 | -1.37e+00 | 4.6e+00 | 5.2e+00 | PCI/L | 02/14/2012 09:09 EST |
| Th234 | -2.53e+02 | 4.6e+02 | 2.8e+02 | PCI/L | 02/14/2012 09:09 EST |
| U235 * | -3.99e+00 | 1.1e+01 | 1.7e+01 | PCI/L | 02/14/2012 09:09 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01778Y | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 16:25 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | -2.02e-01 | 1.3e+01 | 2.1e+01 | PCI/L | 02/14/2012 10:07 EST |
| Bi214 * | 5.26e+02 | 7.4e+01 | 5.0e+01 | PCI/L | 02/14/2012 10:07 EST |
| K40 | -1.15e+00 | 1.2e+01 | 1.9e+01 | PCI/L | 02/14/2012 10:07 EST |
| Pb214 * | 5.91e+02 | 8.6e+01 | 6.0e+01 | PCI/L | 02/14/2012 10:07 EST |
| Ra226 * | -8.84e-01 | 3.4e+01 | 5.4e+01 | PCI/L | 02/14/2012 10:07 EST |
| Ra228 | -6.14e-01 | 4.1e+00 | 5.4e+00 | PCI/L | 02/14/2012 10:07 EST |
| Th234 | -4.43e+01 | 3.9e+02 | 3.1e+02 | PCI/L | 02/14/2012 10:07 EST |
| U235 * | 2.76e-01 | 1.2e+01 | 1.9e+01 | PCI/L | 02/14/2012 10:07 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01779Z | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 21:27 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | 3.74e+00 | 1.1e+01 | 1.9e+01 | PCI/L | 02/14/2012 15:18 EST |
| Bi214 * | 1.58e+02 | 4.1e+01 | 4.8e+01 | PCI/L | 02/14/2012 15:18 EST |
| K40 | 1.00e+00 | 1.1e+01 | 1.8e+01 | PCI/L | 02/14/2012 15:18 EST |
| Pb214 * | 1.84e+02 | 5.4e+01 | 6.2e+01 | PCI/L | 02/14/2012 15:18 EST |
| Ra226 * | 3.78e+00 | 2.9e+01 | 5.0e+01 | PCI/L | 02/14/2012 15:18 EST |
| Ra228 | -2.83e+00 | 7.0e+00 | 5.6e+00 | PCI/L | 02/14/2012 15:18 EST |
| Th234 | -7.61e+01 | 7.5e+02 | 3.0e+02 | PCI/L | 02/14/2012 15:18 EST |
| U235 * | -1.59e+00 | 1.3e+01 | 1.9e+01 | PCI/L | 02/14/2012 15:18 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01780R | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/24/2012 15:06 | 1000.0 | GE03 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 1.36e+01 | 1.4e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Bi214 * | 2.02e+02 | 3.0e+01 | | PCI/L | 02/14/2012 15:19 EST |
| K40 | 5.63e+00 | 1.6e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Pb212 | -2.54e+00 | 2.6e+00 | | PCI/L | 02/14/2012 15:19 EST |
| Pb214 * | 1.83e+02 | 2.7e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Ra226 * | -8.99e+00 | 3.3e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Ra228 | 2.44e+00 | 5.3e+00 | | PCI/L | 02/14/2012 15:19 EST |
| Th234 * | 9.14e+00 | 5.4e+01 | | PCI/L | 02/14/2012 15:19 EST |
| U235 * | -1.38e+01 | 9.3e+00 | | PCI/L | 02/14/2012 15:19 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01780R | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 1.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | DUP |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/24/2012 15:07 | 1000.0 | GE18 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 8.42e-01 | 4.0e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Bi214 * | 1.80e+02 | 4.2e+01 | | PCI/L | 02/14/2012 15:19 EST |
| K40 | -3.73e+00 | 2.9e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Pb212 * | -7.01e+00 | 4.7e+00 | | PCI/L | 02/14/2012 15:19 EST |
| Pb214 * | 2.05e+02 | 3.9e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Ra226 * | 7.41e+00 | 3.4e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Ra228 | -1.92e+01 | 1.5e+01 | | PCI/L | 02/14/2012 15:19 EST |
| Th234 * | -9.00e+01 | 6.4e+01 | | PCI/L | 02/14/2012 15:19 EST |
| U235 * | -1.14e+01 | 9.9e+00 | | PCI/L | 02/14/2012 15:19 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01781T | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 15:34 | 1000.0 | GE03 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 * | 5.62e+00 | 1.4e+01 | | PCI/L | 02/14/2012 14:47 EST |
| Bi214 * | 4.50e+02 | 6.5e+01 | | PCI/L | 02/14/2012 14:47 EST |
| K40 | -6.13e+00 | 1.6e+01 | | PCI/L | 02/14/2012 14:47 EST |
| Pb212 * | -4.80e+00 | 2.6e+00 | | PCI/L | 02/14/2012 14:47 EST |
| Pb214 * | 4.70e+02 | 6.5e+01 | | PCI/L | 02/14/2012 14:47 EST |
| Ra226 * | 6.82e+00 | 3.2e+01 | | PCI/L | 02/14/2012 14:47 EST |
| Ra228 | -1.97e+00 | 5.5e+00 | | PCI/L | 02/14/2012 14:47 EST |
| Th234 * | 1.12e+01 | 5.4e+01 | | PCI/L | 02/14/2012 14:47 EST |
| U235 * | -1.81e+01 | 9.4e+00 | | PCI/L | 02/14/2012 14:47 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01782U | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 15:34 | 1000.0 | GE15 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 4.80e+00 | 1.7e+01 | | PCI/L | 02/13/2012 15:05 EST |
| Bi214 * | 6.32e+02 | 8.7e+01 | | PCI/L | 02/13/2012 15:05 EST |
| K40 | 5.94e+00 | 1.3e+01 | | PCI/L | 02/13/2012 15:05 EST |
| Pb212 | 2.91e+00 | 2.7e+00 | | PCI/L | 02/13/2012 15:05 EST |
| Pb214 * | 6.73e+02 | 9.1e+01 | | PCI/L | 02/13/2012 15:05 EST |
| Ra226 * | 5.91e+00 | 3.3e+01 | | PCI/L | 02/13/2012 15:05 EST |
| Ra228 | 7.84e-01 | 5.3e+00 | | PCI/L | 02/13/2012 15:05 EST |
| Th234 * | 4.03e+01 | 3.4e+01 | | PCI/L | 02/13/2012 15:05 EST |
| U235 * | -2.95e+01 | 8.9e+00 | | PCI/L | 02/13/2012 15:05 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01783V | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 15:34 | 1000.0 | GE16 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 9.25e-01 | 9.8e+00 | | PCI/L | 02/13/2012 10:38 EST |
| Bi214 * | 4.10e+02 | 6.0e+01 | | PCI/L | 02/13/2012 10:38 EST |
| K40 | 6.38e-01 | 1.1e+01 | | PCI/L | 02/13/2012 10:38 EST |
| Pb212 * | -3.17e+00 | 1.4e+00 | | PCI/L | 02/13/2012 10:38 EST |
| Pb214 * | 3.84e+02 | 5.5e+01 | | PCI/L | 02/13/2012 10:38 EST |
| Ra226 * | -7.76e+00 | 2.0e+01 | | PCI/L | 02/13/2012 10:38 EST |
| Ra228 | 4.03e-02 | 2.7e+00 | | PCI/L | 02/13/2012 10:38 EST |
| Th234 * | -2.30e+01 | 2.2e+01 | | PCI/L | 02/13/2012 10:38 EST |
| U235 * | -1.70e+01 | 5.3e+00 | | PCI/L | 02/13/2012 10:38 EST |

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01784W | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 15:34 | 1000.0 | GE22 | RCL |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|-----|-------|----------------------|
| Bi212 | 3.90e-01 | 1.4e+01 | | PCI/L | 02/13/2012 14:57 EST |
| Bi214 * | 3.46e+02 | 5.7e+01 | | PCI/L | 02/13/2012 14:57 EST |
| K40 | -2.81e+00 | 1.2e+01 | | PCI/L | 02/13/2012 14:57 EST |
| Pb212 * | -6.16e+00 | 2.2e+00 | | PCI/L | 02/13/2012 14:57 EST |
| Pb214 * | 4.01e+02 | 5.9e+01 | | PCI/L | 02/13/2012 14:57 EST |
| Ra226 * | 1.48e+01 | 1.8e+01 | | PCI/L | 02/13/2012 14:57 EST |
| Ra228 | -6.39e-01 | 4.5e+00 | | PCI/L | 02/13/2012 14:57 EST |
| Th234 * | -3.15e+01 | 3.1e+01 | | PCI/L | 02/13/2012 14:57 EST |
| U235 * | -8.29e+00 | 6.2e+00 | | PCI/L | 02/13/2012 14:57 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01785X | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/29/2012 10:44 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | 3.62e+00 | 1.3e+01 | 2.1e+01 | PCI/L | 02/14/2012 10:33 EST |
| Bi214 * | 3.77e+02 | 6.5e+01 | 5.8e+01 | PCI/L | 02/14/2012 10:33 EST |
| K40 | 5.62e+00 | 1.3e+01 | 1.9e+01 | PCI/L | 02/14/2012 10:33 EST |
| Pb214 * | 3.98e+02 | 7.3e+01 | 6.8e+01 | PCI/L | 02/14/2012 10:33 EST |
| Ra226 * | 3.19e+00 | 3.1e+01 | 5.3e+01 | PCI/L | 02/14/2012 10:33 EST |
| Ra228 | 9.65e-01 | 3.2e+00 | 5.3e+00 | PCI/L | 02/14/2012 10:33 EST |
| Th234 | -1.15e+02 | 4.4e+03 | 3.0e+02 | PCI/L | 02/14/2012 10:33 EST |
| U235 * | -7.42e+00 | 1.2e+01 | 2.0e+01 | PCI/L | 02/14/2012 10:33 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | B2.01877A | QC batch #: | 0008495N |
| Matrix: | WATER-DRINKING | Assay batch #: | 0015743M |
| Sample type: | SAM | Prep procedure: | N/A |
| Amount analyzed: | 3.000e+00 L | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | ANA |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/29/2012 15:46 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|-------|----------------------|
| Bi212 | 5.62e-01 | 1.4e+01 | 2.3e+01 | PCI/L | 02/15/2012 11:36 EST |
| Bi214 * | 6.89e+02 | 9.0e+01 | 4.9e+01 | PCI/L | 02/15/2012 11:36 EST |
| K40 | -3.98e+00 | 1.5e+01 | 1.9e+01 | PCI/L | 02/15/2012 11:36 EST |
| Pb214 * | 7.43e+02 | 1.0e+02 | 6.5e+01 | PCI/L | 02/15/2012 11:36 EST |
| Ra226 * | -7.10e-01 | 3.4e+01 | 5.5e+01 | PCI/L | 02/15/2012 11:36 EST |
| Ra228 | -7.68e-01 | 4.4e+00 | 6.5e+00 | PCI/L | 02/15/2012 11:36 EST |
| Th234 | -5.75e+01 | 5.0e+02 | 3.0e+02 | PCI/L | 02/15/2012 11:36 EST |
| U235 * | -2.36e+00 | 1.3e+01 | 2.0e+01 | PCI/L | 02/15/2012 11:36 EST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | LCS-00631915X | QC batch #: | 0008495N |
| Matrix: | N/A | Assay batch #: | 0015743M |
| Sample type: | N/A | Prep procedure: | N/A |
| Amount analyzed: | 1.000e+00 SAMP | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | LCS |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/29/2012 02:29 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|------|----------------------|
| Bi207 | 3.70e+03 | 4.0e+02 | 1.2e+01 | PCI | 12/15/2010 11:00 CST |
| Bi212 | 2.30e+00 | 1.1e+02 | 1.8e+02 | PCI | 12/15/2010 11:00 CST |
| Bi214 * | -5.33e+00 | 2.6e+01 | 2.0e+01 | PCI | 12/15/2010 11:00 CST |
| Eu155 | 8.52e+02 | 1.2e+02 | 8.4e+01 | PCI | 12/15/2010 11:00 CST |
| K40 | 8.09e+01 | 4.5e+01 | 6.7e+01 | PCI | 12/15/2010 11:00 CST |
| Pb214 * | -3.29e+00 | 3.9e+01 | 3.5e+01 | PCI | 12/15/2010 11:00 CST |
| Ra226 * | 2.66e+01 | 2.2e+02 | 3.7e+02 | PCI | 12/15/2010 11:00 CST |
| Ra228 | -9.02e+00 | 6.3e+01 | 4.6e+01 | PCI | 12/15/2010 11:00 CST |
| U235 * | -3.08e+01 | 7.7e+01 | 1.2e+02 | PCI | 12/15/2010 11:00 CST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100248

SAMPLE ANALYSIS REPORT

| | | | |
|---------------------|----------------|---------------------|--------------|
| Sample #: | RBK-00631916Y | QC batch #: | 0008495N |
| Matrix: | N/A | Assay batch #: | 0015743M |
| Sample type: | N/A | Prep procedure: | N/A |
| Amount analyzed: | 1.000e+00 SAMP | Analysis procedure: | NAREL GAM-01 |
| Dry/wet weight: | N/A | Analyst: | RCL |
| Ash/dry weight: | N/A | QC type: | RBK |
| Sample description: | N/A | | |
| Comment: | N/A | | |

COUNTING INFORMATION

| Date and time | Duration (min) | Detector ID | Operator |
|------------------|----------------|-------------|----------|
| 02/28/2012 01:58 | 300.0 | GE14 | MO |

ANALYTICAL RESULTS

| Analyte | Activity | $\pm 2 \sigma$ Uncertainty | MDC | Unit | Date |
|---------|-----------|-------------------------------|---------|------|----------------------|
| Bi212 | 2.52e+01 | 3.3e+01 | 5.4e+01 | PCI | 02/24/2012 07:00 CST |
| Bi214 * | 3.42e+01 | 1.5e+01 | 2.0e+01 | PCI | 02/24/2012 07:00 CST |
| K40 | -1.70e+01 | 3.6e+01 | 5.6e+01 | PCI | 02/24/2012 07:00 CST |
| Pb214 * | 2.12e+01 | 1.6e+01 | 2.3e+01 | PCI | 02/24/2012 07:00 CST |
| Ra226 * | -2.58e+01 | 1.6e+02 | 1.5e+02 | PCI | 02/24/2012 07:00 CST |
| Ra228 | 9.22e+00 | 1.0e+01 | 1.6e+01 | PCI | 02/24/2012 07:00 CST |
| Th234 | -1.90e+02 | 1.7e+03 | 5.2e+02 | PCI | 02/24/2012 07:00 CST |
| Tl208 | 4.35e+00 | 3.9e+00 | 5.2e+00 | PCI | 02/24/2012 07:00 CST |
| U235 * | 5.54e+00 | 2.9e+01 | 4.8e+01 | PCI | 02/24/2012 07:00 CST |

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 1100248

QC BATCH SUMMARY

QC batch #: 0008495N
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

| NAREL Sample # | QC Type | Yield (%) | $\pm 2 \sigma$ Uncertainty (%) | Analyst |
|-----------------|---------|-----------|--------------------------------|---------|
| B2.01731G | | N/A | | RCL |
| B2.01732H | | N/A | | RCL |
| B2.01733J | | N/A | | RCL |
| B2.01734K | | N/A | | RCL |
| B2.01735L | | N/A | | RCL |
| B2.01736M | | N/A | | RCL |
| B2.01737N | | N/A | | RCL |
| B2.01761N | | N/A | | RCL |
| B2.01762P | | N/A | | RCL |
| B2.01763Q | | N/A | | RCL |
| B2.01777X | | N/A | | RCL |
| B2.01778Y | | N/A | | RCL |
| B2.01779Z | | N/A | | RCL |
| B2.01780R | | N/A | | RCL |
| B2.01780R | DUP | N/A | | RCL |
| B2.01781T | | N/A | | RCL |
| B2.01782U | | N/A | | RCL |
| B2.01783V | | N/A | | RCL |
| B2.01784W | | N/A | | RCL |
| B2.01785X | | N/A | | RCL |
| B2.01877A | | N/A | | RCL |
| LCS-00631915X * | LCS | N/A | | RCL |
| RBK-00631916Y * | RBK | N/A | | RCL |

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0008495N

Analytical Method: NAREL GAM-01

METHOD BLANKS (PCI)

| Sample ID | Nuclide | Activity $\pm 2\sigma$ | Prep Date | Flags |
|-----------|---------|-------------------------|------------|-------|
| 00631916Y | BI212 | 2.52e+01 \pm 3.3e+01 | 2012-02-24 | OK |
| 00631916Y | BI214 | 3.42e+01 \pm 1.5e+01 | 2012-02-24 | J |
| 00631916Y | K40 | -1.70e+01 \pm 3.6e+01 | 2012-02-24 | OK |
| 00631916Y | PB214 | 2.12e+01 \pm 1.6e+01 | 2012-02-24 | J |
| 00631916Y | RA226 | -2.58e+01 \pm 1.6e+02 | 2012-02-24 | J |
| 00631916Y | RA228 | 9.22e+00 \pm 1.0e+01 | 2012-02-24 | OK |
| 00631916Y | TH234 | -1.90e+02 \pm 1.7e+03 | 2012-02-24 | OK |
| 00631916Y | TL208 | 4.35e+00 \pm 3.9e+00 | 2012-02-24 | WARN |
| 00631916Y | U235 | 5.54e+00 \pm 2.9e+01 | 2012-02-24 | J |

LABORATORY DUPLICATES (PCI/L)

| Sample ID | Nuclide | Original $\pm 2\sigma$ | Duplicate $\pm 2\sigma$ | RPD | Z |
|-----------|---------|-------------------------|-------------------------|--------|----------|
| B2.01780R | BI212 | 1.36e+01 \pm 1.4e+01 | 8.42e-01 \pm 4.0e+01 | 176.68 | -0.60 OK |
| B2.01780R | BI214 | 2.02e+02 \pm 3.0e+01 | 1.80e+02 \pm 4.2e+01 | 11.52 | -0.85 OK |
| B2.01780R | K40 | 5.63e+00 \pm 1.6e+01 | -3.73e+00 \pm 2.9e+01 | 985.26 | -0.56 OK |
| B2.01780R | PB212 | -2.54e+00 \pm 2.6e+00 | -7.01e+00 \pm 4.7e+00 | 0.00 | -1.67 OK |
| B2.01780R | PB214 | 1.83e+02 \pm 2.7e+01 | 2.05e+02 \pm 3.9e+01 | 11.34 | 0.93 OK |
| B2.01780R | RA226 | -8.99e+00 \pm 3.3e+01 | 7.41e+00 \pm 3.4e+01 | 0.00 | 0.69 OK |
| B2.01780R | RA228 | 2.44e+00 \pm 5.3e+00 | -1.92e+01 \pm 1.5e+01 | 0.00 | -2.65 OK |
| B2.01780R | TH234 | 9.14e+00 \pm 5.4e+01 | -9.00e+01 \pm 6.4e+01 | 0.00 | -2.37 OK |
| B2.01780R | U235 | -1.38e+01 \pm 9.3e+00 | -1.14e+01 \pm 9.9e+00 | 0.00 | 0.35 OK |

LAB CONTROL SAMPLES (PCI)

| Sample ID | Nuclide | Amt Added $\pm 2\sigma$ | Measured $\pm 2\sigma$ | %R | Z |
|-----------|---------|-------------------------|------------------------|-------|----------|
| 00631915X | BI207 | 3.95e+03 \pm 3.9% | 3.70e+03 \pm 4.0e+02 | 93.77 | -1.14 OK |
| 00631915X | BI212 | NO SPIKE DATA | | | |
| 00631915X | BI214 | NO SPIKE DATA | | | |
| 00631915X | EU155 | 8.57e+02 \pm 5.7% | 8.52e+02 \pm 1.2e+02 | 99.42 | -0.08 OK |
| 00631915X | K40 | NO SPIKE DATA | | | |
| 00631915X | PB214 | NO SPIKE DATA | | | |
| 00631915X | RA226 | NO SPIKE DATA | | | |
| 00631915X | RA228 | NO SPIKE DATA | | | |
| 00631915X | U235 | NO SPIKE DATA | | | |

Analyst:

PC Joury

3-5-12 R. Michele Dos 3-5-12

QA Officer:

Kim G. Miller

3/5/12

With J flags - 100% 3/5/12